What is claimed is:

1. In a powertrain of an accelerating motor vehicle having an engine, a secondary power source, and a step-change automatic transmission for driving a load, a method for controlling an upshift of the transmission from a current gear to a next gear, the method comprising the steps of:

establishing first shift points of a demanded engine output and a corresponding vehicle speed, at which the upshift would occur if the engine were the only power source;

determining the length of a first period in which energy is available to the secondary power source;

determining the length of a second period for the current vehicle speed to increase to a target vehicle speed of a first shift point whose corresponding demanded engine output is equal to a combined current demanded output of the engine and secondary power source;

comparing the lengths of the first period and second period; and

producing the upshift if the length of the second period is equal to or greater than the length of the first period.

2. The method of claim 1, further comprising the steps of:

establishing second shift points of an engine output torque and a corresponding vehicle speed at which a downshift to the next lower gear from the current gear would occur if the engine were the only power source;

determining from the second shift points a first torque magnitude required to be transmitted by the powertrain to the load for an upshift to occur at the current vehicle speed;

determining a second torque magnitude equal to the sum of a torque currently transmitted to the load by the engine and secondary power source;

comparing the first and second torque magnitudes; and

producing the upshift if the second torque magnitude is greater than the first torque magnitude.

3. The method of claim 1, wherein the step of determining the length of a first period, further comprises the steps of:

determining a first magnitude of energy currently available to the secondary power source;

determining a current time rate of energy consumed by the secondary power source at the current demanded engine output; and

dividing the first energy magnitude by the current time rate of energy consumed by the secondary power source.

4. The method of claim 1, wherein the step of determining the length of a second period, further comprises the steps of:

determining a first difference between the target vehicle speed and the current vehicle speed;

determining a current vehicle acceleration; and

dividing the first difference by the current vehicle acceleration.

5. The method of claim 1, wherein the step of determining the length of the second period comprises the steps of:

determining a current vehicle acceleration;

determining a current vehicle speed; and

dividing the current vehicle speed by the vehicle acceleration.

6. The method of claim 1, wherein the step of determining the length of the second period comprises the steps of:

determining a current vehicle acceleration by the Kalman filter acceleration method;

determining a current vehicle speed; and

dividing the current vehicle speed by the vehicle acceleration.

7. The method of claim 1, wherein the step of determining the length of the second period comprises the steps of:

determining a current vehicle acceleration by the Modified Central Difference acceleration method;

determining a current vehicle speed; and

dividing the current vehicle speed by the vehicle acceleration.

8. The method of claim 1, wherein the step of determining the length of the second period comprises the steps of:

repetitively determining at frequent intervals a current vehicle speed; and

determining the time rate of change of current vehicle speed between the intervals; and

dividing the time rate of change of current vehicle speed between the intervals by the current vehicle speed.

9. The method of claim 1, further comprising:

determining a vehicle acceleration limit;

comparing a current vehicle acceleration and the vehicle acceleration limit; and

while the current vehicle acceleration is equal to or greater than the vehicle acceleration limit, producing the upshift when a current demanded engine output and a current vehicle speed correspond to one of the first shift points.

10. In a powertrain of an accelerating motor vehicle having an engine, a secondary power source, and a step-change automatic transmission for driving a load, a method for controlling, with the aid of an electronic controller in communication

with the engine and transmission, an upshift of the transmission from a current gear to a next gear, the method comprising the steps of:

inputting to the controller a data base including at least first shift points of a demanded engine output and a corresponding vehicle speed, at which the upshift would occur if the engine were the only power source;

repetitively inputting to the controller at frequent intervals a first magnitude of energy currently available to the secondary power source, a current time rate of energy consumed by the secondary power source at the current demanded engine output, a current vehicle speed, a current demanded engine output based at least in part on position of an accelerator pedal;

repetitively calculating in the controller at frequent intervals the time rate of change of current vehicle speed between the intervals, the length of a first period in which energy is available to the secondary power source, and the length of a second period for the current vehicle speed to increase to a target vehicle speed of a first shift point whose corresponding demanded engine output is equal to a combined current demanded output of the engine and secondary power source;

comparing in the controller the lengths of the first period and second period; and

generating a command to initiate an upshift from the current gear to the next gear if the length of the second period is equal to or greater than the length of the first period.

11. The method of claim 10, further comprising the steps of:

inputting to the controller a data base further including second shift points of an engine output torque and a corresponding vehicle speed at which a downshift to the next lower gear from the current gear would occur if the engine were the only power source;

determining from the second shift points a first torque magnitude required to be transmitted by the powertrain to the load for an upshift to occur at the current vehicle speed;

determining a second torque magnitude equal to the sum of a torques currently transmitted to the load by the engine and by the secondary power source;

comparing the first and second torque magnitudes; and

generating a command to initiate an upshift from the current gear to the next gear if the second torque magnitude is greater than the first torque magnitude.

12. The method of claim 10, wherein the step of calculating the length of a first period, further comprises the steps of:

repetitively further inputting to the controller at frequent intervals a first magnitude of energy currently available to the secondary power source, and a current time rate of energy consumed by the secondary power source at the current demanded engine output; and

calculating in the controller at frequent intervals the length of the first period by dividing the first energy magnitude by the current time rate of energy consumed by the secondary power source.

13. The method of claim 10, wherein the step of calculating the length of the second period, further comprises the steps of:

calculating in the controller at frequent intervals a first difference between the target vehicle speed and the current vehicle speed, a current vehicle acceleration, and

dividing the first difference by the current vehicle acceleration.